

With respect to the §102(b) rejection claims 1-27 and 29-32 as being anticipated by *Bialik et al.* (U.S. Pat. No. 5,568,588) and the §103(a) rejection of claim 28 as being unpatentable over the *Bialik '588* reference, Applicant respectfully traverses and requests the Examiner to more closely review this asserted reference.

Overview of Applicant's Invention

The present invention is directed to a significant improvement over the *Bialik '588* reference's teaching of multi-pulse speech analysis and synthesis ("MPA").

Multi-pulse speech analysis and synthesis typically involves dividing the incoming speech signals into frames and then analyzing each frame to determine its representative components, for example, using a frame analyzer to determine the short-term and long-term characteristics of the speech signal. Typically, one, both, or neither of the long- and short-term predictor contributions are subtracted from the input frame, leaving a target vector whose shape has to be characterized from a multiplicity of samples.

As discussed in the background section of Applicant's Specification, one particular MPA approach is described by the *Bialik '588* reference. The target vector is modeled by a plurality of pulses of equal amplitude, varying location and varying sign (positive and negative). To select each equal-amplitude pulse, a pulse is placed at each sample location and the effect of the pulse, defined by passing the pulse through a filter defined by the LPC coefficients, is determined. The pulse which provides the filter output that most closely matches the target vector is selected and its effect is removed from the target vector, thereby generating a new target vector. The process continues until a predetermined number of pulses have been found. For storage or transmission purposes, the result of the MPA analysis is a collection of pulse locations, pulse signs (positive or negative), and a quantized value of the equal pulse amplitude in each sequence.

The MPA output typically specifies the resulting pulse locations, but not the order in which they were chosen. It also specifies only one gain parameter, so the decoder must reconstruct the pulse sequence using equal amplitudes for all the pulses in the sequence.

According to an example embodiment, the present invention significantly improves over the *Bialik* '588 reference by performing a more accurate MPA analysis; an MPA analysis that, from a maximum-likelihood standpoint, has a much better opportunity for determining the best possible pulse sequence to match the target vector because the pulse sequence is reconstructed using varying amplitude pulses in the sequence. By determining a better match to the target, the perceptual quality of the reconstructed speech is significantly improved.

Issues Before The Examiner

Applicant respectfully submits that there are three issues which, when fully considered with the following remarks, would be answered in a manner that overcomes each of the prior art rejections.

Issue I: Are The §102(b) Rejections Proper When The *Bialik* '588 Reference Does Not Correspond To The Claimed Invention Including, Among Other Limitations, Generating A Pulse Sequence With Variable Amplitude Pulses?

Issue II: Is The §103(a) Rejection of Claim 28 Proper When The Prior Art Teaches Away From The Claimed Invention And The Modification Proposed By The Examiner?

Issue III: Is The §10(a) Rejection of Claim 28 Proper When The Record Is Void Of Evidence That Would Support The Modification Proposed By The Examiner?

Applicant's Position On The Issues

Before addressing these issues, Applicant hereby corrects the Examiner's opinion that "It will be clear to person that Fig. 1 of instant application and Fig. 1 of patent 5,568,588 are same. Also Fig. 2 of instant application and Figs. 2 and 7 of patent 5,568,588 are same. Therefore both ... discloses same subject matter [*sic*]."

On the contrary, FIG. 1 of the instant Application was drafted relative to Fig. 1 of the '588 patent with explicit differences shown and discussed in the Specification; namely, blocks 24 and 25 (FIG. 1) of the instant Application differ entirely in both name and functionality as discussed at pages 8 *et seq.* of the instant Application, and the input to block 25 is not a target vector (as in the '588 patent) but rather a pair of correlation signals.

Moreover, the flow chart shown in Fig. 2 of the instant application is entirely dissimilar to Fig. 7 of the '588 reference, and Fig. 2 of the instant application and Figs. 2a-2c of the '588 reference are similar only in regards to the first block.

These differences are most important in overall operational aspects. As further discussed below, the *Bialik* '588 reference unequivocally explains that, "*The pulse sequence is a series of positive and negative pulses having the current gain level.*" (column 4, lines 29-30), whereas Applicant's claimed invention is directed to generation of a pulse sequence in which there are "variable-amplitude pulses" (e.g., claims 1, 7 and 10). The Examiner is correct in opining that the *Bialik* '588 reference selects different gain levels but not in opining that different gain levels are associated with any single sequence of pulses: for each pulse sequence of the *Bialik* '588 reference, there is only one gain level and each such pulse therefore has the same amplitude.

With a proper understanding of the differences between the teachings of the '588 patent and the instant invention, as further discussed below, Applicant believes a favorable response should be forthcoming.

Issue I: Are The §102(b) Rejections Proper When The *Bialik* '588 Reference Does Not Correspond To The Claimed Invention Including, Among Other Limitations, Generating A Pulse Sequence With Variable Amplitude Pulses?

Contrary to Applicant's claimed invention, the *Bialik* '588 reference does not teach "generating from the target vector and the short term characteristics, a plurality of sequences of variable-amplitude pulses." The subject §102(b) rejections of claims 1-27 and 29-32 are largely based on the false assertion that column 4, lines 12-51 of the *Bialik* '588 reference teaches this claimed aspect concerning generation of such variable-amplitude pulses (Office Action at top of p.3). This citation to column 4, lines 12-51 does not teach or suggest generating any sequence of variable-amplitude pulses. Rather, this portion of the *Bialik* '588 reference expressly contradicts the Examiner's position: the cited discussion concerns operation of *Bialik*'s gain level selector 24 and pulse sequence determiner 25 and these '588 blocks provide that for each pulse sequence, there is only one gain level used to define a common amplitude for each such pulse.

Bialik's gain level selector 24 outputs on output line 32 "a current gain level for which sequence of *equal amplitude pulses* is to be determined." See *Bialik* '588 reference,

column 4, lines 19-23. Thus, each of *Bialik's* gain levels is for a sequence of *equal amplitude pulses*. The operation of *Bialik's* gain level selector 24 is further characterized at column 5, lines 55 through column 6, line 7, where *Bialik* explains that "for each gain index, the first pulse is the location of the pulse determined by pulse location determiner 20 (in steps 44-50). The remaining pulses can be anywhere else within the subframe and can have positive or negative gain values. In step 56, the gain selector 24 stores the first pulse position and its amplitude." Thus, *Bialik's* gain level selector 24 associates each gain index with a pulse sequence (of equal amplitude pulses) by pointing to the first pulse as located by pulse location determiner 20 (see column 4, lines 7-30). Throughout and particularly in connection with discussion of *Bialik's* gain level selector 24 and pulse sequence determiner 25, the *Bialik '588* reference unequivocally explains that:

The pulse sequence is a series of positive and negative pulses having the current gain level.

Bialik '588 reference, column 4, lines 29-30. Nowhere does the *Bialik '588* reference teach that, in connection with *Bialik's* gain level selector 24 and pulse sequence determiner 25, more than one gain level is associated with each pulse sequence.

In further support of Applicant's traversal, reference may be made to column 6, lines 38-42, of the *Bialik '588* reference where Figs. 3A and 3B are described to illustrate "two examples of different pulse sequence outputs of pulse sequence determiner 25" where the sequence of Fig. 3A has a *single* gain index of 7 and the sequence of Fig. 3B has a *single* gain index of 8. As is inherent through this teaching, each of these figures shows a pulse sequence having a common pulse amplitude. This truth necessarily follows from the *Bialik '588* reference's teaching that each pulse sequence has only one gain index associated therewith.

The Examiner has also argued (at pages 13-14 in Response to Applicant's Arguments) that equation 6 (column 5) and the associated teaching for the gain level selector 24 (column 4, lines 19-23) "would clearly correspond" to Applicant's claimed generation of a pulse sequence having pulses of variable-amplitudes. However, as explained above, the *Bialik '588* reference does not associate more than one gain level with each pulse sequence.

Accordingly, it is untenable for the Examiner to argue that the *Bialik* '588 reference would be interpreted to teach, as claimed, generation of a plurality of sequences of variable-amplitude pulses

Issue II: Is The §103 Rejection of Claim 28 Proper When The Prior Art Teaches Away From The Claimed Invention And The Modification Proposed By The Examiner?

The asserted prior art teaches away from the modification proposed by the Examiner (and the instant invention).

Applicant's invention is directed to a plurality of sequences of variable-amplitude pulses, whereby the amplitudes of the pulses within a single sequence are different and related by a mathematical formula. In contrast, the '588 reference is directed to a plurality of sequences of equal-amplitude pulses wherein each sequence in the plurality of sequences has a different gain value. The pulses within a single sequence of the '588 reference are of equal-amplitude and therefore not structured and related by a mathematical formula (e.g., exponential function).

In contrast and as discussed above, the *Bialik* '588 reference selects a gain level for each sequence of pulses, and for each pulse sequence of the *Bialik* '588 reference, there is only one gain level and each such pulse therefore has the same amplitude. As stated in the Summary of the *Bialik* '588 reference, each pulse sequence is processed (measured, filtered, compared, etc.) as a "single gain pulse sequence" (column 2, lines 7-15).

The Examiner erroneously asserts that the skilled artisan would be lead by the prior art to modify the '588 reference to modify the *Bialik* '588 reference so that it uses an exponential modification function to provide pulses of varying amplitude in each pulse-train sequence because this would allegedly improve output speech quality. Applicant submits that modifying the *Bialik* '588 reference in this regard would not improve output speech quality because the functional blocks described by the *Bialik* '588 reference would still operate under the design principle that the pulses in each pulse-train sequence have the same amplitude. Thus, the Examiner's assertion is illogical.

The Examiner's assertion in this regard would also undermine the operation and objectives of the *Bialik* '588 reference. As stated in the Summary of the *Bialik* '588

reference and discussed above, each pulse sequence has a single gain level and each pulse sequence is processed as this "single gain pulse sequence" (column 2, line 11). The Examiner's proposed modification, however, would result in a different set of objectives, in an inaccurate "perceptual weighting filter" (column 2, lines 11-12), inoperable gain selector, and due to a set of unmappable gain levels for each pulse sequence, such pulse sequences which would not be identifiable to "minimize the energy of the error vector and its corresponding gain level" (column 2, lines 12-15). According to long-standing case law, modifying a reference in a manner that undermines its operation and/or objectives is *per se* evidence that the prior art teaches away from the claimed invention. *See, e.g., In re Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984) (A §103 rejection cannot be maintained when the asserted modification undermines purpose of main reference.).

Moreover, consistent with the discussion above, Applicant submits that the asserted prior art fails to teach all aspects of claim 28 and further fails to teach (as acknowledged at page 13) modifying the pulse train based on the exponential function. The Examiner takes "Official Notice" as to it being "well-known in the art of speech processes to use pulse trains constructed based on the exponential function." In his Response to Arguments, the Examiner states that a reference is provided to show "that it is well known that pulse-train sequence modification function is based on the exponential function." If the alluded to reference is Section 5.5 of Discrete-Time Processing of Speech Signals by Deller, Hansen and Proakis, Applicant fails to recognize where such teaching exists. Applicant can only find references to Pitch and Formant estimation and is unable to see where the reference teaches searching multi-pulse sequences in order to code a speech excitation. Thus, Applicant maintains its traversal of this "Official Notice" and submits that the rejection fails to provide a *prima facie* case of obviousness in regards to either correspondence to the claimed invention or evidence of motivation for the alleged combination.

If this rejection is to be maintained, consistent with 35 U.S.C. §132, Applicant requests from the Examiner the alleged reference(s) which would support the rejection and the "Official Notice."

Issue III: Is The §103 Rejection of Claim 28 Proper When The Record Is Void Of Evidence That Would Support The Modification Proposed By The Examiner?

The Examiner has failed to provide evidence of motivation for making the asserted modification of the '588 reference. As discussed above, the Examiner's citations evidence that the only prior art of record teaches away from the claimed invention. It is not Applicant's burden, however, to establish these truths.

Specifically, to support a *prima facie* of obviousness in connection with such a modification of the '588 reference, the Examiner must specifically identify clear and particular reasons that indicate why one of ordinary skill in the art would have been motivated to select the missing claim limitations and modify the '588 reference with them. See, e.g., *In re Dembiczak*, 175 F.3d 994, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999). Evidence has not been provided of any teaching or suggestion for using the '588 reference in connection with modifying the pulse-train sequence based on the exponential function, as claimed in the instant invention, or for modifying the reference to achieve the claimed limitations. The law requires that evidence of motivation must be specifically identified and shown by some objective teaching in the prior art leading to the modification. "Our court has provided [that the] motivation to combine may be found explicitly or implicitly: 1) in the *prior art references* themselves; 2) in the knowledge of those of ordinary skill in the art that certain *references*, or disclosures in those references, are of special interest or importance in the field; or 3) from the nature of the problem to be solved, 'leading inventors to look to *references* relating to possible solutions to that problem.'" *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 57 U.S.P.Q.2d 1161 (Fed. Cir. 2000). The Office Action fails to identify evidence of why one skilled in the art would be led to modify the '588 reference, and does not provide any evidence of factual teachings, suggestions or incentives from the prior art that lead to the proposed modification.

The Examiner failed to cite any evidence in support of the modification.

Conclusion

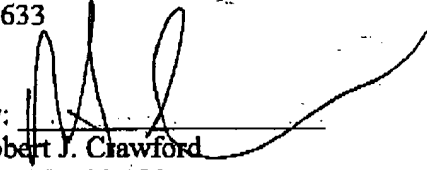
In view of the remarks above, Applicant believes that each of the rejections has been overcome and the application is in condition for allowance. Should there be any

remaining issues that could be readily addressed over the telephone, the Examiner is encouraged to contact the undersigned at (651) 686-6633.

Respectfully submitted,

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